

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

Claim 1 (Currently Amended) A liquid crystal display (LCD) device comprising:

    a first substrate having a grooved surface profile;

    an alignment film layer of inorganic or organic material formed on said grooved surface and having said grooved surface profile, said alignment film of inorganic or organic material being aligned in response to subject to an ion beam incident to said grooved surface in a direction parallel to a groove direction to thereby generate increased alignment force for constraining deposited LC material to a desired direction;

    a second substrate aligned opposite said first substrate for forming a plurality of LCD cells having said liquid crystal (LC) material deposited therein, wherein LC molecules align parallel to the grooves for enhanced LCD performance.

Claim 2 (Currently Amended) The LCD device according to Claim 1, wherein said alignment film layer material of underlayer comprises one selected from the group comprising: SiN<sub>x</sub>, hydrogenated amorphous silicon, SiC, SiO<sub>2</sub>, glass, Al<sub>2</sub>O<sub>3</sub>, CeO<sub>2</sub>, SnO<sub>2</sub>, ZnTiO<sub>2</sub>, and InTiO<sub>2</sub>, InZnO<sub>2</sub>, and other organic or inorganic dielectric film and conducting films.

Claim 3 (Currently Amended) The LCD device according to Claim 1, wherein said alignment film layer of inorganic or organic material is diamond-like carbon.

Claim 4 (Original) The LCD device according to Claim 1, wherein a second substrate aligned opposite said first substrate includes a top alignment layer having a flat surface profile.

Claim 5 (Original) The LCD device according to Claim 1, wherein a second substrate aligned opposite said first substrate includes a top alignment layer having a grooved surface profile.

Claim 6 (Original) The LCD device according to Claim 1, wherein a surface anchoring energy is increased as compared to LC material deposited between flat substrate surfaces.

Claim 7 (Original) The LCD device according to Claim 1, wherein aligning the LC molecules parallel to the grooves enables decreased potential energy of said LC molecules.

Claim 8 (Original) The LCD device according to Claim 1, wherein said alignment film of material comprises one selected from the group comprising:  $\text{SiN}_x$ , hydrogenated amorphous silicon,  $\text{SiC}$ ,  $\text{SiO}_2$ , glass,  $\text{Al}_2\text{O}_3$ ,  $\text{CeO}_2$ ,  $\text{SnO}_2$ ,  $\text{ZnTiO}_2$ , and  $\text{InTiO}_2$ ,  $\text{InZnO}_2$ , and other organic or inorganic dielectric film and conducting films.

Claim 9 (Original) The LCD device according to Claim 1, wherein said grooved surface profile of said alignment film is sinusoidal.

Claim 10 (Original) The LCD device according to Claim 1, wherein said grooves are not continuous along a lengthwise direction.

Claim 11 (Original) The LCD device according to Claim 10, wherein the grooves are terminated in a length direction and restart in a slightly different location lengthwise with different height and width of said grooves.

Claims 12-17 (Canceled)

Claim 18 (New) The LCD device according to Claim 1, wherein subjecting said alignment film to said incident ion beam in a direction parallel to a groove direction avoids weak anchoring and 90 degree meta-stable states in liquid crystal (LC) material resulting in said increased alignment force.